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XXXIII. *Meteorological Observations at Caën in Normandy;*
for 1765, 1766, 1767, 1768, 1769. By Nathanael
Pigott, Esq; communicated by the late Dr. Bevis, F. R. S.

Read May 9, 1771.

1765.

Months	Days	Barometer	Inches	Mean	Ther.	Mean	Remarks
January	31 9	Greatest height Least ditto	30,20 29,10	29,65			Wind chiefly S. S. W. 15th frost in the morning; the rest of the month was cloudy.
	8 31	Greatest ditto Least ditto			46,5 37,5	42	
February	24 28	Greatest ditto Least ditto	30,14 28,87	29,505			Wind chiefly N. and E. N. E. 4th frost and cloudy; 18th, 19th, 20th, 21st, 24th, 26th, small frost; 27th thaw; 28th rainy.
	27 19	Greatest ditto Least ditto			44,5 33,5	39	
March	8 23 1	Greatest ditto Least ditto	30,02 28,97	29,495			Wind chiefly S. S. W. 11th, 12th, 14th, 19th, 20th, 27th, 28th, high wind; 13th, 18th, 30th, 31st, stormy.
	24 1	Greatest ditto Least ditto			51,0 40,0	45,5	
April	12 20	Greatest ditto Least ditto	30,38 29,57	29,975			Wind variable; 1st stormy; 4th, 6th, 7th, 8th, 9th, 10th, 13th, 14th, 15th, 22d, high wind; sky almost always cloudy: 2d some swallows: 26th some thunder: fruit trees begin to bloom.
	27 28 13	Greatest ditto Least ditto			67,5 47,5	57,5	
May	12 15 24	Greatest ditto Least ditto	30,24 29,56	29,90			Wind mostly in the N. points: this month remarkable for fine sun, and clear sky.
	22 23 5	Greatest ditto Least ditto			67,0 53,0	60,0	
June	9 16 17	Greatest ditto Least ditto	30,22 29,78	30,00			Wind mostly in the North points: weather changeable the whole month: 3d some thunder and lightning with heavy rain at 4h P. M.
	4 5 29 30	Greatest ditto Least ditto			70,0 61,0	65,5	

Month

Meteorological Observations, at Caën in Normandy.

1765.

Months	Days	Barometer	Inches	Mean	Ther.	Mean	Remarks
July	4	Greatest height	30,28	29,99			Wind most in the northern points; beginning, cloudy sky; middle, sun with clouds; end, windy and sun with flying clouds; 25th at 7h. P.M. therm. 77°.
	7	Least ditto	29,70				
	19 25	Greatest ditto			72,0	67,0	
	1	Least ditto			62,0		
August	18	Greatest ditto	30,30	29,66 +			These observations are from the 10th to the 24th only. Wind variable; the beginning showery; 12th stormy; end, sunshine and clouds,
	22	Least ditto	29,03				
	23 12	Greatest ditto			76,0	67,5	
		Least ditto			59,0		
November	21	Greatest ditto	30,27	29,645			Wind variable: beginning rainy; middle foggy; end, white frost in the mornings.
	25	Least ditto	29,02				
	1 23 24	Greatest ditto			56,0	49,0	
		Least ditto			42,0		
December	16	Greatest ditto	30,34	29,73			Wind chiefly in the East points: beginning frosty: 5th hard frost; 8th, 9th, 10th, 11th, rain: remainder, almost constant frost.
	11	Least ditto	29,12				
	8 25	Greatest ditto			51,0	44,0	
		Least ditto			37,0		

1766.

January	29	Greatest ditto	30,72	30,375			Wind chiefly E. S. E. from the beginning till the 20th, foggy and cloudy till the 30th; 31st, frost, 29th, 30th, 72 inches: height of barometer carefully set down.
	2 3	Least ditto	30,03				
	31 11	Greatest ditto			40,0	33,5	
		Least ditto			27,0		
February	19	Greatest ditto	30,61	30,065			In the beginning wind in the North points; in the middle in the South; at the end to the Northern points; frost till 11th; wind and rainy till the end.
	17	Least ditto	29,52				
	15 8	Greatest ditto			45,0	37,5	
		Least ditto			30,0		

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Mete-

Meteorological Observations at Caën in Normandy.

1766.

Month	Days	Barometer	Inches	Mean	Ther.	Mean	Remarks
March	7 26	Greatest height Least ditto	30,29 28,84	29,565			Wind variable; 1st, 22d, stormy; 26th hurricane; 23d, 24th, 25th, wind and snow in the nights. The whole month mostly cloudy: from 25th to 26th, quicksilver fell in barometer 0,67 inches.
	13 1 3	Greatest ditto Least ditto			53,0 40,0	46,5	
April	7 24	Greatest ditto Least ditto	30,40 29,35	29,875			Wind variable; most part of the month rain and wind.
	27 1	Greatest ditto Least ditto			57,0 48,0	52,5	
July	4 9	Greatest ditto Least ditto	30,08 29,69	29,885			These observations from the 2d to the 16th only. Wind variable; cloudy and rainy.
	10 3	Greatest ditto Least ditto			70,5 63,0	66,75	
August	26 22	Greatest ditto Least ditto	30,27 29,86	30,065			Wind at beginning in the North points; middle variable; end in the South points. Clouds and wind almost the whole month.
	9 17	Greatest ditto Least ditto			76,0 64,0	70,0	
September	17 7	Greatest ditto Least ditto	30,38 29,60	29,99			Wind till towards the end varying; from the 25th S. S. E. Clouds and wind the whole month.
	27 16	Greatest ditto Least ditto			72,0 60,0	66,0	
October	2 8	Greatest ditto Least ditto	29,84 29,27	29,555			Wind mostly E. S. E. the end of the month variable; clouds and wind; 6th stormy: these observations from the 1st to the 10th only.
	5 9	Greatest ditto Least ditto			70,0 62,0	66	

Meteorological Observations, at Caën in Normandy.

1767.

Months	Days	Barometer	Inches	Mean	The.	Mean	Remarks
January	21	Greatest height	30,10	29,575			Wind mostly S. S. E. this month frosty; sometimes sharp and high winds.
	13	Least ditto	29,05				
	30	Greatest ditto			52,0	41,25	
13	Least ditto			30,5			
February	1	Greatest ditto	30,03	29,665			Wind most in the South points. Rainy and windy from the 9th to the 15th. These observations only down to the 15th.
	8	Least ditto	29,30				
	1	Greatest ditto			54,0	52,0	
10	Least ditto			50,0			
May	24	Greatest ditto	33,30	29,86			Wind varying the whole month. mostly rainy and windy.
	30	Least ditto	29,42				
	16	Greatest ditto			62,0	58,5	
4	Least ditto			55,0			
June	10	Greatest ditto	30,15	29,77			Wind varying. 3d stormy; the whole month windy and rainy.
	3	Least ditto	29,39				
	29	Greatest ditto			65,5	60,25	
3	Least ditto			55,0			
July	18	Greatest ditto	30,02	29,825			Wind varying. 21st stormy; from the 11th to the 30th cloudy and rainy. Few flies yet in the apartments, and those cannot fly.
	21	Least ditto	29,63				
	16	Greatest ditto			67,0	65,0	
12	Least ditto			63,0			
September	13	Greatest ditto	30,16	29,89			These observations only from the 1st to the 15th; wind varying; weather changeable.
	4	Least ditto	29,62				
	4	Greatest ditto			72,0	68,0	
15	Least ditto			64,0			

Meteorological Observations at Caën in Normandy.

1767

Months	Days	Barometer	Inches	Mean	The.	Mean	Remarks
October	15 8	Greatest height Least ditto	30,16 29,68	29,92			These observations from the 7th to the 20th only. Wind most in the North points, chiefly cloudy, some rain.
	8 14	Greatest ditto Least ditto			62,0 53,0	57,5	
November	28 15	Greatest ditto Least ditto	30,37 29,21	29,79			These observations from 14th to 29th only. Wind chiefly in the S. points; 18th, 21st, 22d, sun-shine and small frost. 16th the leaves still green on the trees.
	27 23	Greatest ditto Least ditto			54,0 47,0	50,5	
December	3 20	Greatest ditto Least ditto	30,44 29,19	29,815			23d began to freeze very hard with N. N. E. wind. See an account of this frost lower down. 1st, most trees have leaves, but yellow and begin to fall. 13th, the trees stripped of their leaves.
	8 27	Greatest ditto Least ditto			54,0 33,0	43,5	

1768

January	5 8	Greatest ditto Least ditto	30,00 29,10	29,55			Wind mostly in the East points. 1st, much snow: high wind; hard frost to the 8th; 8th, thaws. The rest of the month rainy and windy.
	30 6	Greatest ditto Least ditto			52,5 22,0	37,25	
February	6 10	Greatest ditto Least ditto	30,37 29,56	29,965			In the beginning wind in the N. points: at the end in the S. This month mostly windy, cloudy and rainy.
	14 4	Greatest ditto Least ditto			57,0 44,0	50,5	

Mete-

Meteorological Observations at Caën in Normandy.

1768

Months	Days	Barometer	Inches	Mean	The.	Mean	Remarks
March	4 11	Greatest height	30,39	29,705			Wind chiefly E. towards the N. greatest part of this month frosty.
	15	Least ditto	29,02				
	1 11 12	Greatest ditto Least ditto			57,0 44,0	50,5	
April	11 29	Greatest ditto Least ditto	30,16 29,43	29,795			Wind changing; 6th, storm of thunder, lightening, and hail, at 5 h. P.M. lightning fell on the church, called Abbaie aux Dames, ran over the choir with quick serpentine motion, and then disappeared without any further mischief; 29th, rain and thunder at 1 h. $\frac{1}{2}$ A. M.
	17 1	Greatest ditto Least ditto			61,0 51,0	56,0	
May	23 29	Greatest ditto Least ditto	30,17 29,35	29,76			Wind chiefly in the N. points. This month was windy, and the sun shone with white broken clouds. 5th, at 10 h. P.M. storm of thunder, lightning and rain.
	23 2 19	Greatest ditto Least ditto			70,0 56,0	63,0	
June	21 26	Greatest ditto Least ditto	30,16 29,55	29,855			Wind chiefly in the Westerly points. 7th, at 4 h. P.M. storm of hail thunder and lightning; from 9th to 22d, windy and rainy; 24th, stormy, with rain thunder and lightning.
	24 20	Greatest ditto Least ditto			69,0 62,5	65,8	
July	21 7	Greatest ditto Least ditto	30,14 29,55	29,845			Wind chiefly in the Westerly points. This month cloudy and windy, with some rain.
	1 20	Greatest ditto Least ditto			73,0 65,0	69,0	
August	9 4	Greatest ditto Least ditto	30,13 29,96	30,015			These observations from the 3d to the 13th only. Wind most in the Western points; sky partly cloudy, partly clear.
	12 9	Greatest ditto Least ditto			70,0 66,0	68,0	

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Meteorological Observations at Caën in Normandy.

1768.

Months	Days	Barometer	Inches	Mean	The.	Mean	Remarks
September	14	Greatest height	30,03	29,74			These observations from the 7th to the 15th only. Wind unsettled. 12th, some thunder in the morning; the other days wind, clouds or rain.
	12	Least ditto	29,45				
	14	Greatest ditto			65,0	62,7+	
	8	Least ditto			60,5		
October							October 30th, betwixt 12 h. and 13 h. at Harcourt, about 5 leagues S. W. of Caën, several gentlemen saw a ball of fire of a whitish colour, apparently of about a foot diameter, which cast a great light in the room, though the curtains were drawn, and there was a great fire and several wax lights in it: its direction from N. to S. It fell with great velocity, and seemingly about 30 or 40 yards from the room, without any explosion. I had just left the apartment, but was immediately informed of it; about 3 hours after, there was a violent hurricane of wind, hail and rain.
November	19	Greatest ditto	30,22	29,41			Barometer at noon the 21st 29,43
	23	Least ditto	28,60				ditto — — 22d 28,46
	15	Greatest ditto			54,0	49,0	fell in 24 hours 0,97 22d, continued rain; at 10½ P. M. smart flashes of lightning with thunder. Wind varying this month and the weather cloudy, rainy and windy; 15th leaves begin to fall.
	23	Least ditto			44,0		
December	12	Greatest ditto	30,40	29,77			Wind chiefly in the Southern points, 2d storm of wind and rain; 14th hard frost. The weather this month unsettled.
	2	Least ditto	29,14				
	1	Greatest ditto			52,0	42,0	
	15	Least ditto			32,0		

Meteorological Observations, at Caën in Normandy.

1769.

Months	Days	Barometer	Inches	Mean	The.	Mean	Remarks
January	14 1	Greatest height Least ditto	30,16 29,49	29,825			Wind chiefly in the Southern points, cloudy, wind and rain; 24th white frost; 22d white frost: the weather this month unfetttled.
	13 22 24	Greatest ditto Least ditto			50,0 39,5	44,7 +	
February	20 5	Greatest ditto Least ditto	30,19 29,26	29,725			Wind mostly in the Eastern points. 4th at 11 h. P. M. hurricane, morning generally white frost. From the 22d to the end of the month, rainy, cloudy, and high wind.
	28 1	Greatest ditto Least ditto			53,0 39,0	46,0	
March	3 11	Greatest ditto Least ditto	30,47 29,20	29,835			Wind in the Northern and West points. All this month clouds and wind; little rain.
	4 10 31	Greatest ditto Least ditto			55,0 46,0	50,5	
April	24 8	Greatest ditto Least ditto	30,13 29,08	29,605			Wind at beginning in the North points; at the middle in the South points; at the end in the North points; 22d, white frost in the morning; the rest of the month chiefly rainy and windy.
	28 2.3.4.5 6	Greatest ditto Least ditto			62,5 46,0	54,2 +	
May	2 14	Greatest ditto Least ditto	30,39 29,50	29,945			Wind varying; 18th, at 3 h. P. M. thunder; 20th at 4 h. P. M. rain with thunder and lightning; 23d, at 11 h. P. M. thunder and lightning; 23d, at 3 h. $\frac{1}{2}$ P. M. ther. 75°; 27th, at 4 h. P. M. a very heavy rain. This month mostly windy and rainy.
	23 13	Greatest ditto Least ditto			73,0 54,0	63,5	
June	11 15	Greatest ditto Least ditto	30,19 29,65	29,92			These observations from 2d to the 19th only; wind chiefly in the W. points. This month cloudy, windy and rainy.
	9.10.13 15	Greatest ditto Least ditto			65,0 61,0	63,0	

Meteorological Observations at Caën in Normandy.

1769.

Month	Days	Barometer	Inches	Mean	Ther.	Mean	Remarks
July	10 8	Greatest height Least ditto	30,16 29,04	29,60			These observations from 6th to 16th only; wind variable; first days clouds; the last days clear sun.
	7 10	Greatest ditto Least ditto			76,0 69,0	72,5	
August	18 22	Greatest ditto Least ditto	30,12 29,50	29,81			These observations from the 14th to the 23d only. Wind chiefly in the West points; clouds and wind.
	15 21	Greatest ditto Least ditto			70,0 63 5	66,7 +	
September	16 12	Greatest ditto Least ditto	30,17 29,40	29,785			Shifting winds; 9th, at 3h. P. M. a very heavy shower of hail from the W. the hailstones about the size of a middling walnut, of different irregular shapes; the largest of some, brought to me after the storm, diminished in volume, and weighed still 2 penny-weights and 2 grains; the storm lasted about 4 or 5 minutes.
	6 19 26	Greatest ditto Least ditto			71,0 60,0	65,5	
October	10 22	Greatest ditto Least ditto	30,30 29,66	29,98			Wind variable; weather unsettled; often changing.
	19 20 7	Greatest ditto Least ditto			63,0 48,6	55,8	
November	28 22 23	Greatest ditto Least ditto	30,52 29,55	30,035			These observations from 18th to 30th only; wind shifting; 19th, 20th, hard frost; the rest of the month mostly wind with some rain.
	27 20	Greatest ditto Least ditto			55,0 40,0	47,5	
December	4 23	Greatest ditto Least ditto	30,38 28,69	29 59			These observations from the 3d to 24th only; the wind almost always in the South points; wind and rain; 23d, squalls at 8h. P. M. the barometer being at 28,69 inches.
	23 8	Greatest ditto Least ditto			55,0 43,0	49,0	

Meteorological Observations at Caën in Normandy.

Inches 1765	Mean height of Barometer	Inches	Mean height of Barometer.	Remarks
29,650	January	29,550	January 1768	These observations were made at noon, in a South-West room, with a barometer, whose tube is about $\frac{1}{10}$ of an inch diameter; in which the motion of the quicksilver, in squalls and gusts of wind, is extremely perceptible; yet, for further satisfaction, I ordered another to be made in London, with the greatest care, by Heath and Wing, with a nonius giving the $\frac{1}{100}$ part of an inch. I placed this barometer by the other, in July 1769; and having compared them every day for a year, I find that the ancient one marks $\frac{5}{100}$ of an inch more than the other; therefore, if from the mean height as above — 29,802 be deduced — 0,050 the true mean height is 29,752
29,505	February	29,965	February	
29,495	March	29,705	March	
29,975	April	29,795	April	
29,900	May	29,760	May	
30,000	June	29,855	June	
29,990	July	29,845	July	
29, 66 +	August	30,015	August	
	September	29,710	September	
29,645	November	29,410	November	
29,730	December	29,770	December	
29,655	mean of these means	29,828 +	mean of these means	
30,375	January 1766	29,825	January 1769	The greatest height observed, at noon, was, Jan. 29, 1766, 30,72 The least, Dec. 23, 1769, at 8 h. P. M.
30,065	February	29,725	February	
29,565	March	29,835	March	
29,875	April	29,605	April	
29,885	July	29,945	May	
30,065	August	29,920	June	
29,990	September	29,600	July	
29,555	October	29,810	August	
		29,785	September	
29,992 —	mean of these means	29,98	October	
		30,035	November	
		29,590	December	
29,575	January 1767	29,805	mean of these means	Limits of the motion of quicksilver — 2,03
29,665	February			
29,860	May			
29,770	June			
29,825	July	Mean height	In the years	
29,890	September			
29,920	October	29,665	1756	
29,790	November	29,922	1766	
29,815	December	29,790	1767	
		29,828 +	1768	
		29,805	1769	
29,790	mean of these means	29,802	mean of these means	

Hence it appears, that if the mean height of barometers, on a level with the surface of the sea, be supposed, with Dr. Scheuchzer, Phil. Transf. N^o 405, 406, — 29,993 inches and the mean height at Caën, — — 29,752 ditto

0,241 the diff.

will be the greater mean weight of the atmosphere at the surface of the sea, then at Caën : and if, with the Doctor, we allow, for each tenth of an inch depression of the quicksilver, 90 feet elevation, my room, which is in the highest part of the town, will be about 217 feet above the level of the sea.

Monsieur de Luc, of Geneva, has given a method to measure the different elevation of places by barometers, grounded on his own observations, far more exact than any other before him ; his rule is, “ the difference of the logarithms of the height of “ the quicksilver, in the two places, reduced into French lines, “ and the logarithms carried to five places, including the characteristicks, will give the difference of elevation in toises, if “ Fahrenheit’s thermometer be nearly at 66° ; but about $\frac{1}{18}$ must “ be deducted from the elevation so given, if the thermometer “ be at 55° or temperate.”

29,993 English inch. = 337,824 French lines log. 25286,8

29,752 ditto = 335,110 ditto log. 25251,9

diff. 34,9 toises

or 209 4 French feet = 223 English feet nearly ; from which if $\frac{1}{18} = 12 \frac{1}{2}$ nearly be deducted, 210 $\frac{1}{2}$ feet remain for the difference of elevation of my room and the surface of the sea, which differs 6 $\frac{1}{2}$ feet from the result given by the first hypothesis.

The greatest height observed, in these five years, with a good Fahrenheit’s thermometer screened from the sun, in a S. W. room, was as follows at noon :

1765 August 23d }
1766 August 9th } 76°
1765 June 7th }

the least height of ditto Jan. 6th 1768 — — 14

1765 August 23, exposed the thermometer, at noon, to the sun, suspended on a thread between two sticks, in the middle of my garden at Caën, which may be about two English acres, so that the thermometer received the least reflected heat possible in that place ; the quicksilver stood as follows,

at

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at 1^h P. M. 97°

at 2 ditto 96

1765 August 26, at a village, called *les Iles Bardelles*, 7 leagues from Caen, the same thermometer, in a South room, from which the sun was excluded by the window shutters, rose to 90°.

An Account of a remarkable degree of cold observed at Caën in Normandy.

1767	Ther.	Hours	Barometer
December	°	h /	Inch.
24	+ 12	at 8 0	30,02
	+ 16	at 9 0	30,02
25	+ 18	at 11 0	{ little wind at E. S. E. small fog. cloudy. 29,9
	+ 15	at 12 44	
	+ 18	at 21 45	
		at 22 00	
26	+ 15	at 10 00	29,67 wind N. E.
	+ 11	at 19 00	
	+ 12	at 21 00	
		at 22 00	
27	+ 17	at 7 00	29,49 no wind.
	+ 16½	at 8 00	
	+ 12	at 10 00	
	+ 11	at 11 00	
	+ 10	at 18 00	
	+ 10	at 20 00	
28		at 22 00	{ little wind S. S. E. flying clouds. 29,46
	+ 15	at 8 20	
	+ 14	at 11 00	
	+ 13	at 19 00	
30	+ 18	at 22 00	29,84 little wind S. flying clouds
	+ 23	at 7 00	
	+ 20	at 10 00	
	+ 11	at 19 00	
	+ 14	at 21 00	An
		at 22 00	

An Account of a remarkable degree of cold, observed at Caën in Normandy.

1768	Ther.	Hours	Barometer.
January	o	h /	
3	+ 10	at 11 00	
	+ 9	at 20 00	
4	+ 11	at 5 00	
	+ 10	at 6 00	
	+ 8	at 8 00	
	+ 6	at 9 15	
	0	at 12	
	— 8	at 19 30	
	0	at 21 0	30,03 clear sky, no wind.
		at 19 0	30,00 wind W. by S.
5	— 2½	at 5 30	
	— 2	at 6 30	
	— 2	at 8 00	
	+ 1	at 9	
	0	at 9 30	
	— 3	at 10 00	
	0	at 10 35	
	0	at 11 00	
	+ 3	at 19 30	
	+ 6	at 20 00	
	+ 7	at 21 00	
	+ 8	at 21 30	
	+ 10	at 22 15	
6	+ 14	at noon	
	+ 12	at 7 15	
	+ 14	at 8 45	
	+ 13	at 10 00	

N. B. The sign + signifies, that the degrees marked by the quick-silver were above 0, or the beginning of the division.
The negative sign — signifies, that the degrees were below 0, or the beginning of the divisions.
The thermometer was exposed in the open air to the North.
The hours are astronomical hours.

Experi-

Experiments on some Liquids.

1768	H. M.	
Jan. 3	11 30	I placed a wine glaſs half full of rack, another half full of rum, in a North window, to the open air: the next day, at the ſame hour, the rack was frozen to a thick jelly, with icy particles; the rum alſo to a jelly, but leſs thick.
	4 50	I expoſed, as above, a wine glaſs, half full of cyder: ditto of beer.
	5 13	Ditto of red wine, called Beaujenci.
	6 30	The cyder began to freeze.
		Ditto conſolidated.
4	5 5	The beer began to freeze.
	6 30	Ditto conſolidated.
	5 12	The wine began to freeze.
	6 30	Ditto nearly conſolidated.
		The icy ſurface of the cyder being broken, it froze over again, in three or four ſeconds, the ice forming, with a progreſſive motion, very perceptible to the eye.
	9 00	I expoſed, as above, a wine glaſs half full of Malaga wine.
		Half ditto of Burgundy, called Migraine.
		Half ditto of Rouffillon wine.
		Half ditto of ſpring water.
5		Half ditto of cyder-brandiy
	9 15	The water began to freeze.
	9 30	Ditto conſolidated.
	9 30	The Malaga, Migraine, Rouffillon, began to freeze.
	11 00	Ditto ditto ditto conſolidated.

N. B. The brandy did not freeze; but the 6th at noon, the quantity was diminished, and some icy particles stuck to the glass, above the surface of what remained. I found, by weighing the above liquids hydrostatically, in a temperate state of heat, that the inigraine, cyder, beaujenci, boer, and the water, were very nearly of the same specific gravity; and that a piece of gold, which

weighed in the water	-	-	224,25 grains,
weighed in the Malaga	-	-	224,00 ditto,
in the Rouffillon	-	-	224,50 ditto,
in the brandy	-	-	225,00 ditto.